

What is claimed is:

1 1. An integrated fluid delivery system for providing a stream of one or more
2 fluids, comprising:

3 a first modular manifold having seamless slots formed therein for
4 internally channeling the one or more fluids along the seamless slots, the first
5 modular manifold receiving the one or more fluids at corresponding sealed
6 porting apertures thereof; and

7 at least one fluid dispensing device in fluidic communication with the first
8 modular manifold for dispensing the stream of one or more fluids.

1 2. The integrated fluid delivery system of claim 1, wherein the first modular
2 manifold comprises two or more plates each having a first face and a second
3 face; the two or more plates joined so that a respective one of the faces of each
4 of the two or more plates abuts a respective one of the faces of a different one of
5 the two or more plates; the seamless slots being formed in one or more of the
6 abutting ones of the faces of the two or more plates, and the porting apertures
7 configured to provide fluid communication between non-abutting ones of the
8 faces of the two or more plates and the seamless slots.

1 3. The integrated fluid delivery system of claim 2, further comprising slot
2 porting apertures and wherein at least one of the two or more plates has a first
3 abutting face with the seamless slots formed therein and a second abutting face;
4 the slot porting apertures configured to provide fluid communication between the
5 seamless slots and the second abutting face.

1 4. The integrated fluid delivery system of claim 1, wherein the manifold
2 comprises:

3 a first base, having first and second surfaces, the first surface including first
4 seamless slots formed therein, the first seamless slots including, along surfaces

thereof, first sealed porting apertures extending from the first seamless slots through the first base to the second surface; and

a face plate sealed to the first surface of the first base for enclosing the first seamless slots.

5. The integrated fluid delivery system of claim 1, wherein the manifold comprises:

a first base, having a first surface including integrated first seamless slots formed therein,

a face plate sealed to the first surface of the first base for enclosing the first seamless slots, the first plate including sealed plate porting apertures positioned to overlay the first seamless slots.

6. The integrated fluid delivery system of claim 1, wherein the manifold comprises:

a first base, having first and second surfaces, the first surface including integrated first seamless slots formed therein, the first seamless slots including, along surfaces thereof, metallic sealed first slot porting apertures extending from the first seamless slots through the first base to the second surface; and

a face plate sealed to the first surface of the first base for enclosing the first seamless slots, the first plate including sealed first plate porting apertures positioned to overlay the first seamless slots, wherein the first slot porting apertures are in fluidic communication with the first plate porting apertures by way of the seamless slots therebetween for channeling fluid.

7. The integrated fluid delivery system of claim 4, wherein the first modular manifold includes:

3 (iii) a second base, the second base having first and second surfaces, the first
4 surface of the second base including second seamless slots formed thereon for
5 channeling the one or more fluids therethrough, the second seamless slots

6 including, along surfaces thereof, second sealed slot porting

7 apertures extending from the surfaces of the second seamless slots
8 through the second base, the first surface of the second base being sealed
9 to the face plate.

1 8. The integrated fluid delivery system of claim 5, wherein the first modular
2 manifold includes:

3 (iii) a second base, the second base having first and second surfaces, the
4 first surface including integrated second seamless slots formed thereon, the
5 second slots including, along surfaces thereof, second sealed slot porting
6 apertures extending from the surfaces of the second slots through the second
7 base, the first surface of the second base being sealed to the face plate the sealed
8 plate porting apertures of the first base overlaying the second integrated slots
9 and the faceplate interposed between the first and second bases with the second
10 sealed slot porting apertures in fluidic communication with the first sealed slot
11 porting apertures through the first and second slots for channeling the one or
12 more fluids therebetween.

1 9. The integrated liquid delivery system of claim 7, wherein the one or more
2 fluids include a precursor from the group consisting of a silicon precursor, a
3 boron precursor and a phosphorous precursor.

1 10. A modular manifold for channeling high purity fluid streams of an
2 integrated fluid delivery system, comprising:

3 a first base, the first base having first and second surfaces, the first
4 surface including at least one first seamless slot formed thereon, the at least one
5 first seamless slot including, along a surface thereof, a first sealed slot porting

6 aperture extending from the surface of the first seamless slot through the first
7 base portion; and

8 a face plate, the face plate being sealed to the first surface of the base for
9 enclosing the at least one first seamless slot.

1 11. The modular manifold of claim 10 wherein the face plate includes at least
2 one sealed plate porting aperture positioned to overlay the at least one first
3 seamless slot, with the at least one first slot porting aperture being in fluidic
4 communication with the plate porting aperture by way of the at least one first
5 seamless slot.

1 12. The modular manifold of claim 10, wherein the first seamless slot is
2 elliptical in cross section.

1 13. The modular manifold of claim 10, wherein the first base is sealed to the
2 face plate by brazing.

1 14. The modular manifold of claim 13, wherein the first base is sealed to the
2 face plate by vacuum brazing.

1 15. The modular manifold of claim 14, wherein a nickel brazing medium is
2 utilized.

1 16. The modular manifold of claim 10, wherein the second surface is opposite
2 the first surface and the first sealed slot porting aperture extends to the second
3 surface.

1 17. The modular manifold of claim 10, further comprising:

2 a valve secured to the slot porting aperture.

1 18. The modular manifold of claim 10, further comprising:

2 a flow controller secured to the sealed plate porting aperture.

1 19. The modular manifold of claim 10 further comprising:

2 a second base, the second base having first and second surfaces, the first
3 surface of the second base including a second seamless slot formed thereon, the
4 second seamless slot including, along a surface thereof, a second sealed slot
5 porting aperture extending from the surface of the second seamless slot through
6 the second base, the first surface of the second base being sealed to the face
7 plate such that the sealed plate porting aperture overlays the second seamless slot
8 and the faceplate is interposed between the first and second bases with the
9 second sealed slot porting aperture in fluidic communication with the first sealed
10 slot porting aperture through the sealed, first and second seamless slots.

1 20. A modular manifold for channeling high purity fluid streams of an
2 integrated fluid delivery system, comprising:

3 a first base, the first base having first and second surfaces, the first
4 surface including a first plurality of integrated seamless slots formed thereon,
5 each one of the first plurality of slots including, along a surface thereof, a first
6 sealed slot porting aperture extending from the surface of the slot through the
7 first base portion;

8 a face plate, the face plate being sealed to the first surface of the base for
9 enclosing the first plurality of seamless slots, the face plate including a plurality
10 of sealed plate porting apertures, each one of the plurality of sealed plate porting
11 apertures positioned to overlay at least one of the first plurality of seamless slots
12 with the first plurality of sealed slot porting apertures in fluidic communication
13 with at least a corresponding one of the plurality of sealed plate porting
14 apertures by way of the sealed slots.

1 21. The modular manifold of claim 20, wherein the first plurality of
2 integrated slots have a smooth and continuous cross section.

1 22. The modular manifold of claim 20, wherein the first base is sealed to the
2 face plate by brazing.

1 23. The modular manifold of claim 22, wherein a nickel brazing medium is
2 used.

1 24. The modular manifold of claim 20, wherein the second surface is opposite
2 the first surface and the plurality of sealed slot porting apertures extend to the
3 second surface.

1 25. The modular manifold of claim 20 further comprising:

2 a second base, the second base having first and second surfaces, the first
3 surface of the second base including a second plurality of integrated slots formed
4 thereon, each one of the second plurality of slots including, along a surface
5 thereof, second sealed slot porting apertures extending from the surface of the
6 slot through the second base portion, the first surface of the second base being
7 sealed to the face plate, each one of the plurality of sealed plate porting
8 apertures positioned to overlay at least one of the second plurality of integrated
9 slots and the face plate is interposed between the first and second bases with the
10 at least one of the plurality of second sealed slot porting apertures is in fluidic
11 communication with at least one of the plurality of first sealed slot porting
12 apertures through the sealed, first and second plurality of integrated slots.

1 26. An integrated fluid delivery system for providing a stream of fluid,
2 comprising:

3 a first modular manifold for internally channeling the fluid along seamless
4 slots formed therein, the first modular manifold receiving one or more fluids at
5 corresponding sealed porting apertures thereof; and

6 a flow controller in fluidic communication with the first modular manifold
7 for dispensing a precise volume of fluid from the integrated liquid delivery
8 system.

1 27. The integrated fluid delivery system of claim 26 further comprising an
2 atomizer in fluidic communication with the first modular manifold for atomizing
3 a liquid into a gas stream to provide a stream of fluid comprising a mixture of an
4 atomized liquid and a gas.

1 28. The integrated fluid delivery system of claim 26 further comprising a
2 vaporizer in fluidic communication with the first modular manifold for
3 vaporizing a liquid to provide a stream of fluid comprising a vaporized liquid.

4 29. A modular manifold for channeling high purity fluid streams of an
5 integrated fluid delivery system, comprising:

6 a first base, the first base having first and second surfaces, the first
7 surface including at least one first seamless slot formed thereon, the at least one
8 first seamless slot including, along a surface thereof, a first sealed porting
9 aperture extending from the surface of the first seamless slot through the first
10 base, the first sealed porting aperture being sealed with a metal seal; and

11 a face plate, the face plate being sealed to the first surface of the first base
12 enclosing the at least one first seamless slot.